United States Department of Agriculture | Forest Service | Blue Mountains Pest Management Service Center, Wallowa-Whitman National Forest | 1401 Gekeler Lane, La Grande, OR 97850-3456, (541) 963-7122

File Code: 3410 **Date:** April 24, 2013

Subject: Upper Imnaha River Corridor Summary and Update

To: District Ranger, Hells Canyon National Recreation Area

The Blue Mountains Pest Management Service Center began to get actively involved in management of the Imnaha Corridor in the summer of 2004 following discovery of an ongoing western pine beetle outbreak there in June of 2003. Entomologist Don Scott was most active in the resulting Imnaha Project, while I assisted on a few data collection and trapping trips. Don's two reports (File Code 3420, dated 09/2004 and 06/2005) provide a thorough summary of the issues and concerns in this area, which I briefly summarize here.

Bark beetles have been active in the area from Blackhorse Campground to Coverdale Campground off and on over the years. Aerial survey maps show a few trees killed in 1997, 1993, and then in 2004. The HCNRA had been conducting yearly salvage to remove green infested trees until about 1999. This yearly salvage was effective at limiting population build-up but no vegetation management was done to address overstocking and trees highly susceptible to bark beetles. When the HCNRA Comprehensive Management Plan was being revised, salvage activity was suspended in the corridor.

A combination of several years of prolonged drought (1999-2005), overstocking, and fire damage instigated the western pine beetle outbreak that began along the Imnaha in 2001 (Scott 09/2004 and Scott 06/2005). The District conducted some prescribed underburning in 1998 and 2000 in the Imnaha River area. Some of the area underburned in 2000 included large ponderosa pines just north of the 39 road along the river. Many of these trees sustained cambium damage at their bases. Due to fire suppression during much of the 20th century, bark flakes and needle accumulations around large ponderosa pines can now be a foot or more deep. Fires burning in this duff frequently smolder and maintain high temperatures for long periods. This causes extensive damage to roots, often consuming root collar bark and killing underlying cambium and rupturing resin canals in the xylem. Damaged trees are stressed and may attract bark beetles.

Reports written following site visits in 2003 and 2004 (letters by Scott 2003, Scott 09/2004) document mortality to large pines beginning about 2001 and continuing and increasing in 2003 and 2004. The 2004 letter documents numerous pockets of 30"+ trees killed in 2-20 tree pockets.

In 2004, Scott recommended that a vegetation management plan for the corridor be developed and implemented. He recommended that fire continue to be reintroduced but with special

precautions that would prevent injury to the base and roots of large pines. He also recommended an Integrated Pest Management plan. The pest management plan had four components:

1. Remove currently infested trees (green, yellow, or reddish, containing live western pine beetles)
2. Use pheromone baited funnel traps to draw down the population
3. Collaborate with PNW to test the use of the anti-aggregant Verbenone
4. Revive the salvage program to annually remove currently infested trees to manage small infestations before they become large

In 2004 the HCNRA began analyzing 2,465 acres as a part of the Bug's Life Fuel Reduction Project to manage stocking and fuels to maintain the large diameter ponderosa pines along the Imnaha River for the long term. In 2005 FHP approved a prevention/suppression project ($120,000) for NEPA work and implementation to remove green infested trees, reduce western pine beetle populations with trapping, and remove competing conifers to improve vigor of desired large trees. In addition, a Western Bark Beetle Initiative project was funded with PNW to test the use of verbenone against western pine beetles. The District, FHP, and PNW Research (Jane Hayes) all cooperated and contributed time and resources to this project.

Actions taken:

In the fall of 2004, 121 infested trees were removed before the beetles emerged. Green infested trees continued to be removed in 2005 and 2006. Over 300,000 western pine beetles were trapped in about 60 pheromone-baited traps in 2005 and again in 2006. This is enough beetles to kill nearly 300 24-inch trees per year (Miller and Keen 1960).

In addition, verbenone was installed in the corridor in 2005 under an experimental use permit to test its effectiveness against western pine beetles. Verbenone is registered against mountain pine beetles in all western pine species and southern pine beetles in southern pine species but its effectiveness on western pine beetles was unknown at the time.

Around 2007 some understory, density management and fuels treatments were begun to increase the vigor of the large overstory ponderosa pine while reducing the risk of crown fire. We had recommended thinning from below to stocking level guidelines for the appropriate plant associations (Cochran and others 1994). We also recommended thinning around the large old pines to reduce their competition stress (Scott 2004). This is most effectively done by removing all competing conifers from a distance of 1 – 1 ½ times the dripline of their individual crown diameters (Mallams 2006).

Around the large desired pines we recommended that duff be raked away from the base, heavier fuels pulled back and away from the boles, and other precautions taken so that fire injury to roots and root collars would be minimized.

Beetle populations declined in 2006 and remained low in 2007 to the present. Some limited trapping of western pine beetles to continue containing the population was done in 2007.

Current conditions:

On June 13, 2011, Don Scott viewed the area again and noted a lack of beetles (recorded in 3420 letter to the District Ranger by Craig Schmitt dated June 17, 2011). In 2012, I visited the corridor briefly with Adriene Holcomb and also noted a lack of recent western pine beetle-killed trees (Fig. 1 & 2).

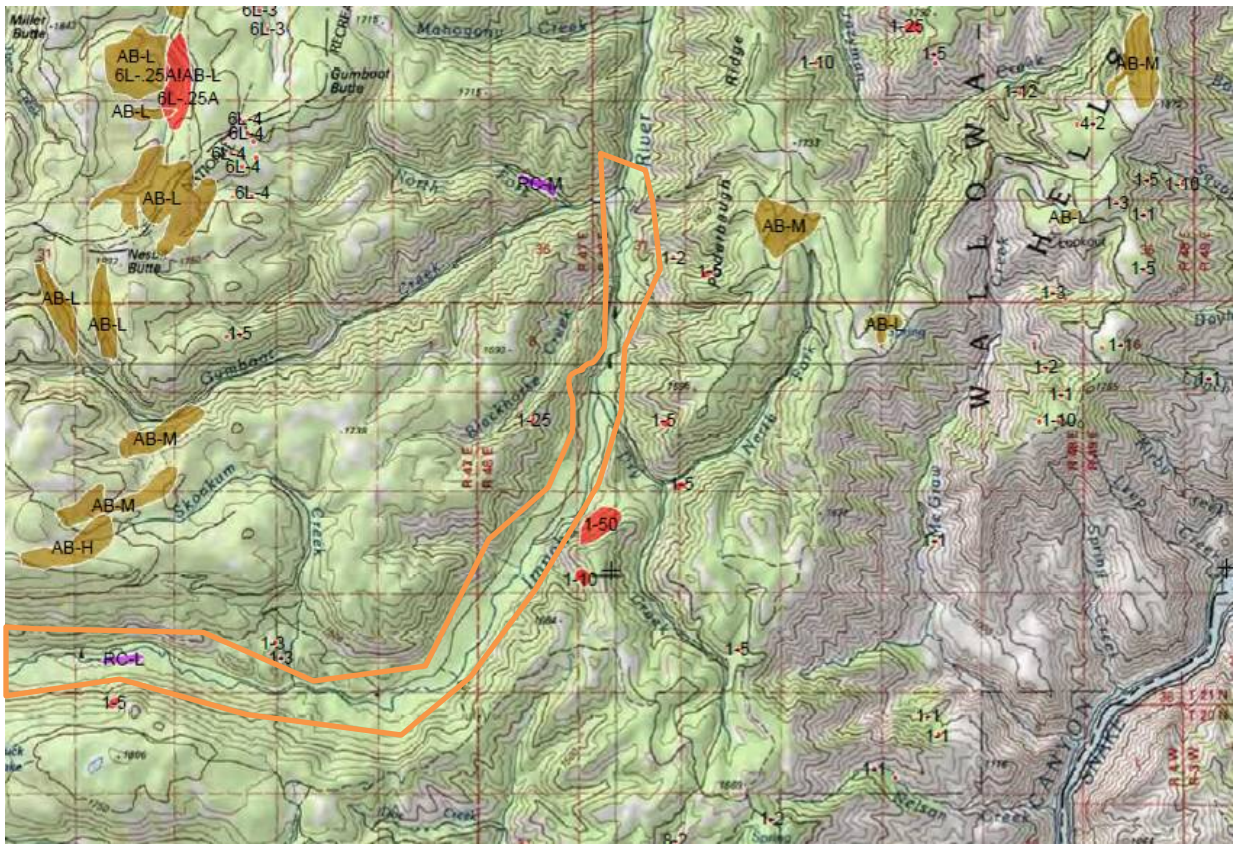

Figure 1: 2012 Insect and disease aerial detection survey map, Riggins quad. The Imnaha River flows from lower left to the middle of the top edge (orange outline), Snake River on the lower right. Ollokot campground is near the large red polygon in the middle. No western pine beetle activity (coded 8 or 88 in red polygons) was detected or shown on this map. Red polygons denote bark beetles, tan polygons denote defoliators. The left side of the code denotes agent and host, the right side denotes number of trees or intensity of damage. AB = balsam woolly adelgid, 6L = mountain pine beetle in lodgepole, RC = needle cast in larch, 1= Douglas-fir beetle. 1-50 means Douglas-fir beetle caused mortality to approximately 50 trees; AB-L means balsam woolly adelgid damage low.

In reviewing the aerial survey maps, there has been no western pine beetle activity recorded since 2007 in this area. The two trees mapped last year are the first in 5 years in the area of the Imnaha river corridor. Western pine beetle populations were higher throughout the Blue and Wallowa Mountains last year than they had been in several years and it could be that conditions are again becoming conducive for population increases. We have not evaluated the risk from beetles in this corridor since the vegetation management project was completed about 5 years ago.

Summary:

Verbenone: The experimental use of verbenone against western pine beetle in ponderosa pine trees did not work. Results did not show a benefit of using verbenone (Jane Hayes, personal communication). An additional, well-replicated study of verbenone and western pine beetle found no effect of verbenone on tree attack (Fettig and others 2009). There is the possibility that verbenone either combined with other semiochemicals or distributed in a different form may act as a more effective anti-aggregant than it has to date. Forest Service and other scientists are working on various formulations of verbenone to try to increase its effectiveness. But at this point in time, verbenone is not labeled for use with western pine beetles and there is no recommended use of it for that purpose.

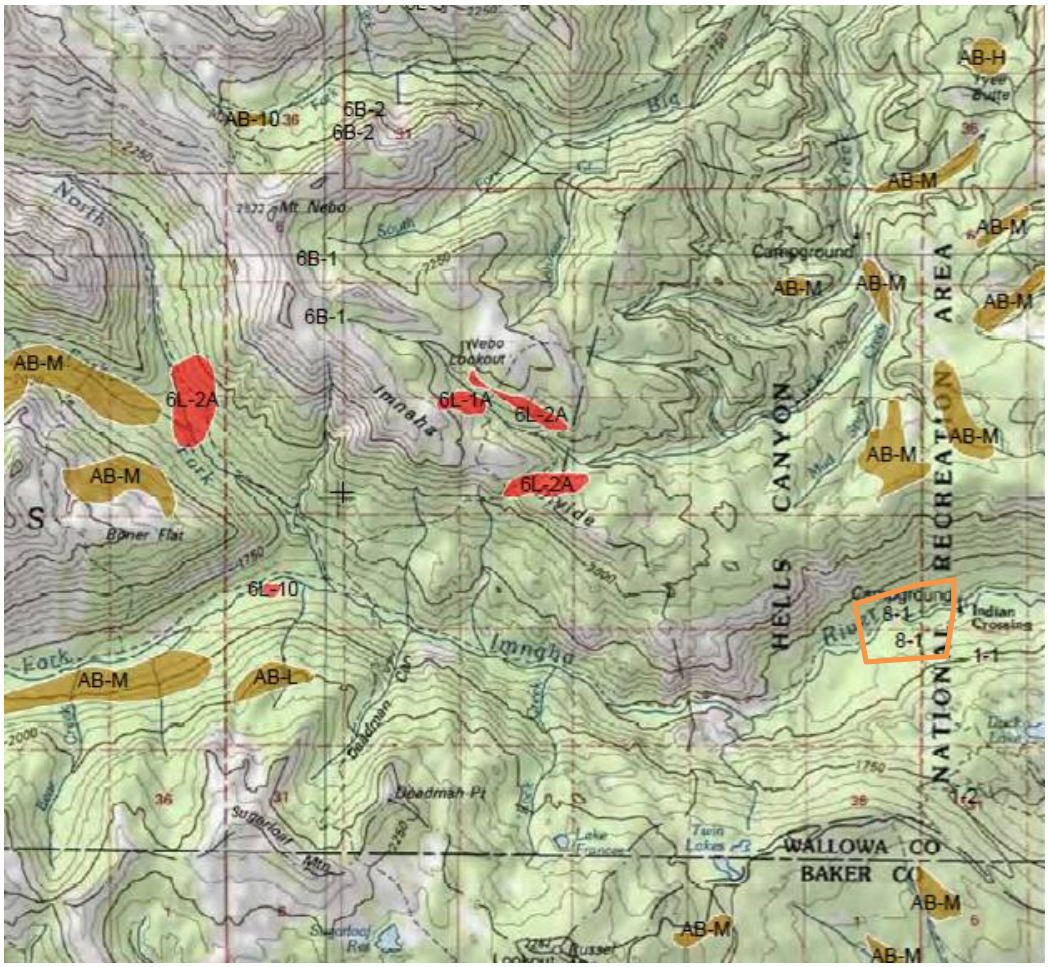

Figure 2: 2012 Aerial detection survey map, Indian crossing campground is in the middle right edge of this map. Two single ponderosa pines killed by western pine beetles (in orange polygon, coded 8-1) are mapped about ½ mile west of the Indian Crossing Campground.

Suppression trapping and infested tree removal: A combination of infested tree removal and suppression trapping removed a very large number of beetles from the Imnaha river corridor in 2005 and 2006. Aerial and ground surveys confirmed that the outbreak had subsided by the end of 2006.

Tree density management: Over the long-term, tree competition and density management along with fuels management will provide the most effective options for maintaining the large, old tree component along the Imnaha River. Stands of large, open grown ponderosa pine were historically maintained by low intensity, frequent fire return intervals of from 15-25 years here (Heyerdahl and Agee 1996). These frequent fires removed much of the conifer regeneration and allowed individual larger, thick barked trees to dominate sites for hundreds of years. Without these frequent fires, active management is necessary to maintain open stands that provide the space and resources these large trees need to survive, and to remove the buildup of bark and needles that accumulates at the base. In addition to competing for resources, regeneration provides ladder fuels that can turn ground fires into crown fires that can kill large pines.

Recommendations:

Density management: The highest priority here should be to manage stand density to maintain adequate growing space to maintain large trees into the future. A warmer climate will increase water needs through increased evapotranspiration. While precipitation patterns for specific areas are difficult to predict, increased temperatures have already occurred (http://www.climate.washington.edu/trendanalysis/) and seem fairly certain to continue (Gutzler and Robbins 2011; http://occri.net/climate-science/the-climate-of-the-pacific-northwest). Prudent management dictates the necessity of maintaining low tree densities as the water needs and thus competition between vegetation is likely to increase. A proactive approach is the only sustainable option that can prevent widespread bark beetle mortality or uncharacteristically severe fire that can threaten these centuries-old trees. This includes maintaining stand stocking within or at the lower management zones identified by Cochran and others (1994). It also means removing competing vegetation for a distance of 1 – 1 ½ the radius of the dripline from around the bole of the large, old pines. These measures will substantially reduce the susceptibility to beetle attack of these trees, assuring they have adequate growing space and are not subjected to moisture stress from competition. Stands need to be restored to the point that they can be managed with frequent, low severity, prescribed fire. In the interim, fuels need to be managed or maintained to prevent root and root crown damage from excessive duff accumulations, and heavy fuels need to be pulled back from tree boles.

Infested tree removal: Should populations show an increase in western pine beetles in the area, prompt removal of infested trees will be necessary to keep populations low. The Service Center continues to support the timely removal of green-infested trees. This helps to maintain low populations of western pine beetles, preventing them from becoming large infestations. This will require constant close monitoring and vigilance, particularly during or following droughty years. The HCNRA staff should continue to monitor the area with both on the ground visits and by viewing the annual aerial detection survey maps. Aerial surveys are generally conducted in August and draft maps are now available within a few days of when the area is flown (http://www.fs.fed.us/wwetac/threat_map/R6_ADS_Review.html). Annual visits late in the summer around September when most of the beetles have flown and early-season attacked trees

are beginning to fade would probably be the best time for a quick walk through of the large trees here.

Late summer visits would also allow time to remove any green infested trees in the fall, prior to the early spring flight of beetles the following May. If trees cannot be removed, they can be felled and the bark burned to destroy the beetles residing in the bark.

If green infested trees cannot be removed or the bark destroyed to kill the beetles within, there is a high likelihood that the beetles produced in these trees will emerge and attack and kill nearby neighboring trees.

Suppression trapping: In addition, suppression trapping may be warranted in the future should populations begin to increase. The effectiveness of suppression trapping is not clear or universally supported and the use of traps is labor intensive. I view them as a last resort. When deploying traps, they need to be placed where they will not result in "spill over" where neighboring trees are attacked and killed. They need to be serviced biweekly. And it is likely numerous traps would be needed. At this time there is no evidence that we need to begin suppression trapping, but it would be wise to keep this option open into the future.

Please contact me with any questions or if you would like copies of any referenced reports.

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/s/ Lia H. Spiegel
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